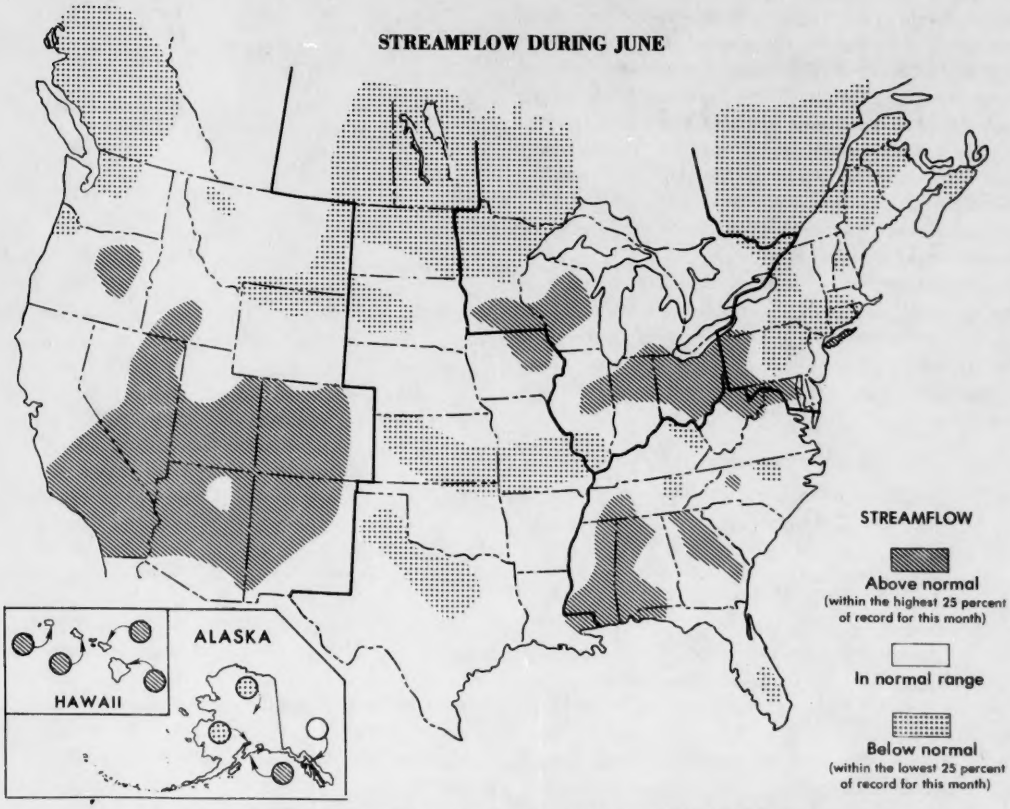
WATER RESOURCES REVIEW for JUNE 1980

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CANADA
DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES BRANCH



STREAMFLOW AND GROUND-WATER CONDITIONS

Streamflow generally decreased in southern Canada, in the Northeast and Southeast Regions, and in the southern States of the Midcontinent Region. Monthly mean flows generally increased in Alaska, Iowa, South Dakota, Utah, and Wisconsin, and were variable elsewhere.

Monthly mean discharge remained in the above-normal range in a large area in and adjacent to Arizona, and in parts of Alabama, Alaska, Georgia, Hawaii, Mississippi, Tennessee, Virginia, and West Virginia. Mean flows increased into that range in parts of each State in the Western Great Lakes Region, and in parts of Pennsylvania, Oregon, and South Carolina. Monthly and/or daily mean flows were highest of record for the month in parts of Ohio and Utah. Flooding occurred in Illinois, Indiana, Iowa, Missouri, Nebraska, Ohio, Oklahoma, and Wisconsin.

Monthly mean flows remained in the below-normal range in large areas in southern Canada and the Upper Midwest, and decreased into that range in British Columbia, and in parts of the New England States, Florida, Kansas, Kentucky, Pennsylvania, South Carolina, Tennessee, and Texas. Monthly and/or daily mean discharges were lowest of record for the month in parts of Quebec and Minnesota.

Ground-water levels declined seasonally in the Northeast Region. Levels were far below average in most of Maine, above average locally in Connecticut, western New York and Pennsylvania, and were generally average elsewhere in the region. In the Southeast Region, levels declined except in parts of Florida, North Carolina, and West Virginia, and were mostly above average except in parts of West Virginia and locally in Florida. In the Western Great Lakes Region, levels mostly declined or held steady; levels were below average in Michigan and northern Minnesota, and average or above average elsewhere. In the Midcontinent Region, levels rose in Iowa and North Dakota, and declined in Arkansas, Nebraska, and in most of the wells in Louisiana and Texas. Levels were mostly below average except in Iowa, where they were above average statewide. In the West, levels rose in Idaho and Montana, and generally declined in Arizona, New Mexico, Nevada, Utah, and southern California. Levels were below average in Arizona, Montana, and New Mexico.

New high ground-water levels for June occurred in Alabama, Nevada, Ohio, and West Virginia, and new alltime highs were reached in Kentucky and Utah. New low levels for June were recorded in Arkansas, Georgia, Idaho, Kansas, Louisiana, New Mexico, and Utah, and new alltime lows were reached in Arizona, Louisiana, Maine, and Texas.

NORTHEAST

[Atlantic Provinces and Quebec; Delaware, Maryland, New York, New Jersey, Pennsylvania, and the New England States]

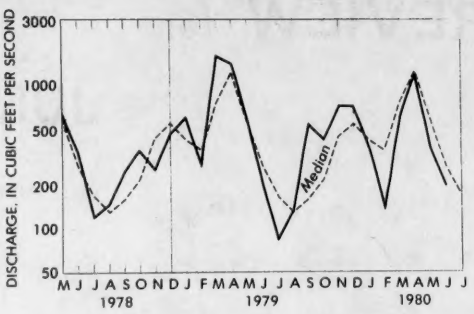
Streamflow decreased seasonally in all parts of the region except in northwestern Pennsylvania, where flows increased, contrary to the normal seasonal pattern. Monthly mean discharges remained in the above-normal range in parts of Maryland, New York, and Pennsylvania. Below-normal streamflow persisted in parts of Quebec, Maine, New Hampshire, and New York, and decreased into that range in parts of the Atlantic Provinces, Connecticut, Massachusetts, New Jersey, and Pennsylvania. Monthly or daily mean flows were lowest of record for the month in parts of Quebec.

Ground-water levels declined seasonally. Levels near end of month were far below average for June in most of Maine; were above average in west-central Connecticut and extreme western parts of New York and Pennsylvania; and were generally near average elsewhere in the region.

STREAMFLOW CONDITIONS

On Long Island, New York, monthly mean flow of Massapequa Creek at Massapequa decreased seasonally to 135 percent of median but remained in the above-normal range for the 3d consecutive month. By contrast, in south-central New York, monthly mean discharge of Susquehanna River at Conklin decreased sharply to less than ½ the median flow and remained in the below-normal range for the 2d consecutive month. In the northern part of the State, monthly mean discharge at the index station, West Branch Oswegatchie River near Harrisville, also decreased seasonally and remained in the below-normal range for the 2d consecutive month and was below the median flow for the 6th consecutive month. (See graph.)

Similarly, in northern New Jersey and the adjacent areas of New York and Pennsylvania, flow in Delaware River, as measured at Trenton, New Jersey, decreased seasonally and was below the normal range and



Monthly mean discharge of West Branch Oswegatchie River near Harrisville, N.Y. (Drainage area, 258 sq mi; 668 sq km)

70 percent of the median flow. In the southern part of the State, monthly mean flow of Great Egg Harbor River at Folsom also decreased seasonally and was in the normal range, after 2 consecutive months of above-normal flow.

In northwestern Pennsylvania, where monthly mean flow of Oil Creek at Rouseville was below the normal range and only 67 percent of median in May, mean flow increased sharply into the above-normal range and was 222 percent of median in June. Also, in western Pennsylvania, mean flows of Allegheny River at Natrona and Monongahela River at Braddock decreased seasonally, were above the normal range, and were 1½ and 3 times their respective median flows as a result of above-normal precipitation during the month. In the Susquehanna River basin in the east-central part of the State, monthly mean discharge as measured at Harrisburg, decreased sharply and was below the normal range for only the second month in the past 3 years.

In central Maryland, monthly mean discharge of Seneca Creek at Dawsonville decreased seasonally, was 187 percent of median, and remained in the above-normal range for the 4th consecutive month. In the Choptank River basin in eastern Maryland and adjacent areas of Delaware, where mean flow during May as measured at the index station near Greensboro, Md., was above the normal range and 187 percent of median,

CONTENTS

	Page
Northeast	2
Southeast	3
Western Great Lakes Region	5
Selected data for the Great Lakes, Great Salt Lake, and other hydrologic sites	8
Midcontinent	9
West	12
Alaska	14
Hawaii	14
Dissolved solids and water temperatures for June at downstream sites on six large rivers	16
Usable contents of selected reservoirs near end of June 1980	17
Flow of large rivers during June 1980	18
Hydrogeologic appraisal of the Klamath Falls geothermal area, Oregon	20

streamflow decreased sharply and remained above median but was within the normal range.

In Connecticut, streamflow decreased sharply at all index stations, was below the normal range for the first month since February 1980, and ranged between 60 and 66 percent of median at the respective sites.

Flows decreased seasonally at index stations throughout central New England. Monthly mean flow in Pemigewasset River at Plymouth, New Hampshire, remained in the below-normal range and was ½ the June median flow. In western Massachusetts, monthly mean discharge of Ware River at Intake Works near Barre decreased sharply, was only 64 percent of median, and was below the normal range for the first time since February 1980. In central Vermont, mean flow of Dog River at Northfield Falls decreased seasonally and remained below median for the 5th consecutive month but was within the normal range. In northern Rhode Island, monthly mean discharge in Branch River at Forestdale also decreased seasonally, but remained above median for the 4th consecutive month.

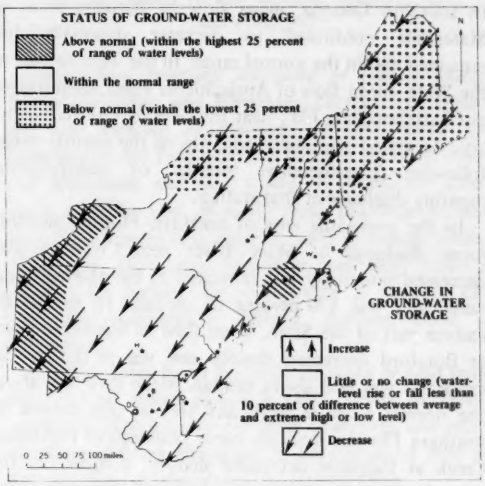
In central and northern parts of Maine, mean flows continued to decrease seasonally in Piscataquis River near Dover-Foxcroft and St. John River below Fish River, at Fort Kent. The flows were below the normal range, and were less than ½ their respective median flows for June. In southern Maine, monthly mean flow of Little Androscoggin River near South Paris was also less than ½ the June median flow but remained in the normal range for the 3d consecutive month.

In central Nova Scotia, mean flow in St. Marys River at Stillwater decreased seasonally to 39 percent of median and was below the normal range for the first time since February 1980. In northern New Brunswick, monthly mean discharge of Upsalquitch River at Upsalquitch also decreased sharply, was less than ½ the June median flow, and was below the normal range for the first time since January 1980. Elsewhere in the Atlantic Provinces, mean flows at index stations were generally below median but within the normal range.

In the extreme southern part of Quebec, south of the St. Lawrence River, monthly mean discharge of St. Francois River at Hemmings Falls (drainage area, 3,710 square miles) decreased sharply but remained in the normal range. The daily mean flow of 883 cfs on the 16th was lowest for June in 54 years of record. In the south-central part of the Province (north of the St. Lawrence River), the monthly mean flow of 12,800 cfs in St. Maurice River at Grand Mere (drainage area, 16,300 square miles) was lowest for June in 80 years of record and marked the 2d consecutive month of below-normal streamflow at that site. Elsewhere in Quebec, monthly mean flows at index stations decreased into the below-normal range as a result of low carryover flow from a much below-normal snowpack from last winter and ranged from 57 to 75 percent of median at the respective sites.

GROUND-WATER CONDITIONS

Ground-water levels declined seasonally throughout the region. Levels near end of month were unusually high for June in extreme western parts of New York and Pennsylvania, and were high also in west-central Connecticut. (See map.) In contrast, levels in northern New England were below average, especially in Maine—at or close to the lowest levels for end of June in 20 or 30 years.



Map shows ground-water storage near end of June and change in ground-water storage from end of May to end of June.

SOUTHEAST

[Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia]

Streamflow decreased seasonally in all parts of the region except in Georgia and west-central Florida where flows increased. Monthly mean discharges remained in the above-normal range in parts of Alabama, Florida, Georgia, Mississippi, North Carolina, Tennessee, and West Virginia. Mean flows decreased into the below-normal range in parts of Kentucky, North Carolina, and Tennessee.

Ground-water levels declined in Virginia, Mississippi, and Alabama; mixed trends were observed in West Virginia, North Carolina, and Florida. Levels were

mostly above average except in parts of West Virginia and locally in Florida. New high ground-water levels for June were reported for West Virginia and Alabama, and a new alltime high occurred in Kentucky. A new June low occurred in Georgia.

STREAMFLOW CONDITIONS

In northwestern Georgia, monthly mean flow of Etowah River at Canton decreased seasonally but remained above the normal range for the 4th consecutive month as a result of high carryover flow from May augmented by increased runoff from rains late in the month. In the central part of the State, monthly mean discharge of Altamaha River at Doctortown increased, contrary to the normal seasonal pattern, and was above the normal range for the 3d time in the past 4 months. In southern Georgia, mean flow of Alapaha River at Statenville continued to decrease seasonally but remained within the normal range. In the western part of the State, mean flow of Apalachicola River, as measured at Chattahoochee, Fla., near the Georgia-Florida boundary, decreased seasonally and was in the normal range, following 3 consecutive months of above-normal monthly discharge at that station.

In the panhandle area of northern Florida, monthly mean discharge of Shoal River near Crestview also decreased seasonally but remained in the above-normal range and was 174 percent of median. In the northeastern part of the State, mean flow of Suwannee River at Branford decreased sharply and was in the normal range but was well above median. Mean flow was above the normal range in April and May at this station. In southern Florida, monthly mean discharge of Fisheating Creek at Palmdale decreased sharply, contrary to the normal seasonal pattern, was below the normal range and was less than 1 percent of the median flow for June. Elsewhere in the State, mean flows were in the normal range.

In west-central Alabama, mean flow of Tombigbee River at Demopolis lock and dam, near Coatopa, continued to decrease seasonally but remained above the normal range for the 11th time in the past 13 months. Elsewhere in the State, monthly mean flows also continued to decrease seasonally but remained above median and were within the normal range.

In southeastern Mississippi, monthly mean flow of Pascagoula River at Merrill decreased seasonally but was 2½ times the median flow for the month and remained above the normal range for the 15th time in the past 18 months. In the northeastern part of the State, mean discharge of Tombigbee River at Columbus continued to decrease seasonally, was 2½ times median, and remained in the above-normal range for the 13th time in the past 15 months. In southern Mississippi, and the adjacent area of Louisiana, mean discharge of Pearl River as measured near Bogalusa, La., decreased seasonally but was 179 percent of median and remained above the normal range for the 18th consecutive month.

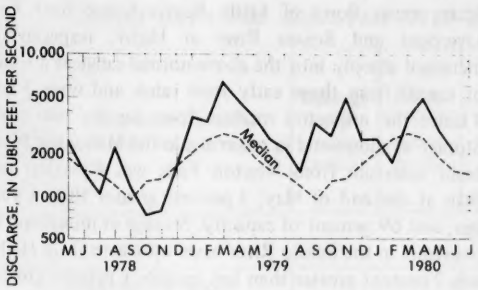
In western Tennessee, monthly mean flow of Buffalo River near Lobelville continued to decrease seasonally but remained in the above-normal range for the 13th time in the past 15 months. In the east-central part of the State, mean flow of Emory River at Oakdale decreased sharply, was only 57 percent of median, and was in the below-normal range. Elsewhere in the State, monthly mean discharges were in the normal range.

In southern Kentucky, mean discharge of Green River at Munfordville decreased seasonally and was less than median but remained in the normal range for the 4th consecutive month. In the northern part of the State, monthly mean flow of Licking River at Catawba also decreased seasonally, was about ½ the median discharge for June, and was in the below-normal range for the 2d consecutive month.

In extreme northern West Virginia, mean flow of Potomac River at Paw Paw continued to decrease seasonally but remained above the normal range as a result of high carryover flow from June and increased runoff from rains near midmonth. Elsewhere in the State, mean flows continued to decrease seasonally and remained in the normal range.

In northern Virginia, where monthly mean discharge of Rapidan River near Culpeper was above the normal range in March, April, and May, mean flow decreased sharply, was less than median, and was in the normal range. In the southeastern part of the State, monthly mean flow of Nottaway River near Stony Creek also decreased sharply, was only 74 percent of median, and remained in the normal range. In the extreme southwestern and central parts of the State, mean flows of North Fork Holston River near Saltville and Slate River near Arvonia decreased, were less than median, and remained in the normal range for the 3d and 5th consecutive months, respectively.

In the west-central Piedmont of North Carolina, monthly mean flow of South Yadkin River near Mocksville continued to decrease seasonally, but remained above the normal range as a result of high carryover flow from May and increased flow from rains late in the month. Mean flow at this station has been in the above-normal range in 14 of the past 18 months. In the extreme western part of the State, mean discharge of French Broad River at Asheville also continued to decrease seasonally but was greater than median and was in the normal range, following 3 consecutive months of flow in the above-normal range. (See graph on page 5.)



Monthly mean discharge of French Broad River at Asheville, N.C. (Drainage area, 945 sq mi; 2,448 sq km)

In northeastern South Carolina, where monthly mean flow of Pee Dee River at Peedee was above the normal range in 7 of the past 9 months, mean discharge decreased into the normal range and was slightly less than the median flow for June. Elsewhere in the State, mean flows of Lynches River at Effingham and North Fork Edisto River at Orangeburg continued to decrease seasonally, were less than median, and remained within the normal range.

GROUND-WATER CONDITIONS

In West Virginia, ground-water levels rose in a few counties in the north-central part of the State and declined elsewhere. Levels were above average in the northwest half of the State and in three extreme eastern counties; they were below average elsewhere.

In Kentucky, levels generally declined slightly, but were above average in most areas. In the Louisville-Jefferson County area, the level in the water-table observation well, despite a slight decline, was again at a new alltime high in 34 years of record.

In Virginia, levels in the three water-table observation wells declined but were above average.

In western Tennessee, the artesian level in the key well in the 500-foot sand near Memphis declined more than ½ foot and continued below average by more than 14 feet.

In North Carolina, levels declined in the mountains and western Piedmont, and rose in the eastern Piedmont and in the Coastal Plain. Levels continued above average statewide.

In Mississippi, levels declined statewide. Levels in some of the wells in the alluvial aquifer declined as much as 10 feet. Moderate declines occurred in other aquifers, but significant declines were reported in wells in the Late Cretaceous aquifer in the Tupelo area in northern Mississippi.

In Alabama, levels declined a little more than a foot but continued above average. Despite a decline of a little more than 1½ feet, the level in the key well at Centreville, Bibb County, was at a new high for June in 28 years of record.

In Georgia, the level in the key artesian well on Cockspur Island in the Savannah area declined nearly 2 feet, reaching a new low for June in 24 years of record.

In Florida, levels declined in most of the State. Levels were above average near Pensacola, but more than 9 feet below average near Mulberry in west-central Polk County. In southeastern Florida, levels rose slightly in Dade and Broward Counties and declined about ½ foot in Palm Beach and St. Lucie Counties.

WESTERN GREAT LAKES REGION

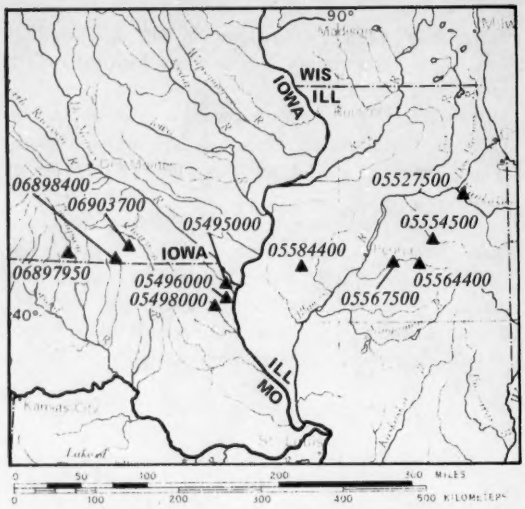
[Ontario; Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin]

Streamflow generally increased in Illinois, Indiana, Minnesota, Ohio, and Wisconsin, decreased in Ontario, and was variable in Michigan. Monthly mean flows remained in the below-normal range in parts of Ontario and Minnesota, and were lowest of record for June in parts of Minnesota. Monthly mean discharge increased into the above-normal range in parts of Illinois, Indiana, Minnesota, Ohio, and Wisconsin, and daily mean discharge was highest for the month in part of Ohio. Flooding occurred in Illinois, Indiana, Ohio, and Wisconsin.

Ground-water levels generally declined or held steady; but showed mixed trends in Ohio. Levels were below average in Michigan and northern Minnesota, and average or above average elsewhere in the region. A new high level for June occurred in northeastern Ohio.

STREAMFLOW CONDITIONS

In central Illinois, severe flooding occurred June 3 as a result of rapid runoff from intense rainfall. Record-breaking flood events were observed at several gaging stations. Selected data on stages, discharges, gaging station locations, and recurrence intervals are given in the accompanying map and table. Also in the central part of the State, monthly mean flow of Sangamon River at Monticello increased sharply, was above the normal range, and was 219 percent of the median flow for the month. In southern Illinois, mean flow of Skillet Fork at Wayne City decreased sharply, was only 18 percent of the June median discharge, and remained below the normal range. In northern Illinois, monthly mean flows of Rock River near Joslin and Pecatonica River at Freeport increased, contrary to the normal seasonal pattern, but remained within the normal range.



Location of stream-gaging stations in Missouri, Illinois, and Iowa, described in table of peak stages and discharges.

In east-central Indiana, moderate flooding occurred early in the month along streams in the upper reaches of the Wabash and White River basins. Peak stages on some streams were reported to have reached their highest levels since 1964, requiring the evacuation of lowland areas along the White River, Mississinewa River, and Wildcat Creek. In Mississinewa River basin, where monthly mean discharge at the index station at Marion was only 52 percent of median, and was below the normal range in May, mean flow increased sharply as a result of the runoff of June 3, was 552 percent of the June median discharge, and was in the above-normal range. Above-normal flows occurred also in Patoka River and Anderson River basins in the southwestern part of the State as a result of the runoff from intense storms on the 23d.

In extreme west-central Ohio, severe flooding occurred along Stillwater River as a result of rapid runoff from torrential rains near monthend. The peak discharge of 23,000 cfs in Stillwater River at Pleasant Hill (drainage area, 503 square miles) on June 29 (gage height, 18.5 feet) is equal to that of a 50-year flood event at that site. On March 25, 1913, a peak discharge of 51,400 cfs was observed at this gaging station site. In extreme northwestern Ohio, monthly mean flow of Maumee River at Waterville (drainage area, 6,330 square miles) increased sharply as a result of runoff from rains early in the month, was 385 percent of median, and was above the normal range. The daily mean discharge of 46,500 cfs on June 5 was highest for the month in 55 years of record. In eastern and central parts of the State, mean flows of Little Beaver Creek near East Liverpool and Scioto River at Higby, respectively, increased sharply into the above-normal range as a result of runoff from those early June rains, and were 3 and 4 times the respective median flows for the two sites. Storage at monthend in reservoirs in the Mahoning River basin upstream from Newton Falls was 4 percent less than at the end of May, 1 percent greater than a year ago, and 69 percent of capacity. Storage at monthend in reservoirs in the Scioto River basin upstream from Higby was 2 percent greater than last month, 1 percent greater than a year ago, and 103 percent of normal capacity.

In central Wisconsin, moderate to severe flooding occurred early in the month as a result of runoff from intense rains on June 5 and 7. Most of the flood flows were in the 2- to 5-year recurrence-interval range except that of Big Eau Pleine River near Stratford (drainage area, 224 square miles) where a peak discharge of about 29,000 cfs (recurrence interval of 75 years) occurred June 6. Big Eau Pleine River is tributary to Wisconsin River. Downstream at Muscoda, monthly mean flow of Wisconsin River increased sharply, from the below-normal range and 61 percent of median discharge in May, to the above-normal range and 135 percent of median discharge in June. Similarly, in the northern part of the State, mean flow of Oconto River near Gillett increased sharply from the below-normal range and 74 percent of median in May, to the above-normal range and 152 percent of median in June. In eastern Wisconsin, increased runoff from rains early in the month resulted in an above-normal monthly mean discharge in Fox River at Rapide Croche Dam near Wrightstown. Elsewhere in the State, monthly mean flows increased, contrary to the normal seasonal pattern, and were within the normal range.

In Michigan's Lower Peninsula, monthly mean flows of Red Cedar River at East Lansing and Muskegon River at Evart decreased seasonally and remained within the normal range. In the northern part of the Lower Peninsula, monthly mean levels of Crooked Lake near Conway, Houghton Lake near Houghton Lake Heights, and Lake Mitchell-Cadillac at Cadillac were, respectively, 0.17 foot, 0.18 foot, and 0.24 foot above normal. In the Upper Peninsula, mean discharge of Sturgeon River near Sidnaw increased from the below-normal range and 39 percent of median in May, to the normal range and 125 percent of median in June. Monthly mean level of Lake Michigamme, also in the Upper Peninsula, was 0.3 foot below the 25-year June median level.

In southeastern Ontario, monthly mean discharge of Saugeen River near Port Elgin continued to decrease seasonally but was greater than the June median

Provisional data; subject to revision

FLOOD DATA FOR SELECTED SITES IN MISSOURI, ILLINOIS, AND IOWA, JUNE 1980

WRD station number	Stream and place of determination	Drainage area (square miles)	Period of known floods	Maximum flood previously known			Maximum during present flood				
				Date	Stage (feet)	Discharge (cfs)	Date	Stage (feet)	Discharge		Recurrence interval (years)
									Cfs	Cfs per square mile	
	MISSOURI										
	FOX RIVER BASIN										
05495000	Fox River at Wayland	400	1922–	Apr. 22, 1973	21.71	26,400	June 4	19.23	14,700	36.8	20
	WYACONDA RIVER BASIN										
05496000	Wyaconda River above Canton	393	1932–	June 30, 1933	30.00	17,700	5	24.86	9,900	25.2	10
	FABIUS RIVER BASIN										
05498000	Middle Fabius River near Monticello	393	1945–	Apr. 23, 1973	27.14	17,700	4	20.67	7,900	20.1	10
	ILLINOIS										
	ILLINOIS RIVER BASIN										
05527500	Kankakee River near Wilmington	5,150	1933–	July 13, 1957	[a]11.40	75,900	June 3	5.89	47,200	9.2	25
05554500	Vermilion River at Pontiac	579	1942–	July 10, 1951	17.90	13,600	3	17.99	[b]14,000	24.2	>100
05564400	Money Creek near Towanda	49.0	1958–	Feb. 10, 1959	11.15	1,600	3	11.53	2,000	40.8	100
05567500	Mackinaw River near Congerville	767	1944–	July 9, 1951	19.41	36,000	3	19.52	[b]40,000	52.2	>100
05584400	Drowning Fork at Bushnell	26.3	1960–	Nov. 1, 1977	[c]10.78	1,680	3	12.88	[b]6,000	228	>100
	IOWA										
	GRAND RIVER BASIN										
06897950	Elk Creek near Decatur City	52.5	1967–	June 14, 1967	18.35	15,000	June 2	[d]28.3	17,500	333	>100
06898400	Weldon River near Leon	104	1958–	Aug. 6, 1959	25.27	48,600	2	22.0	10,000	96.2	40
	CHARITON RIVER BASIN										
06903700	South Fork Chariton River near Promise City	168	1967–	Apr. 10, 1978	21.92	9,700	3	22.9	12,500	74.4	40

[a]Floods in 1883, 1887 reached a stage of 16.73 feet, discharge not determined.
[b]Estimated.
[c]Maximum gage height, 13.26 feet on Sept. 24, 1960.
[d]June 14, 1967 to Sept. 30, 1974, at datum 10.00 feet higher.

discharge and remained in the normal range. In the eastern part of the Province, mean flow of Missinaibi River at Mattice also decreased seasonally and was in the normal range but was less than median. In southwestern Ontario, monthly mean discharge of English River at Umfreville decreased, contrary to the normal seasonal pattern, was only 29 percent of median, and remained below the normal range for the 3d consecutive month.

In west-central Minnesota, mean flow of Buffalo River near Dilworth continued to decrease seasonally, was only 25 percent of median, and remained in the below-normal range. (See graph on page 8.) In the eastern part of the State, monthly mean discharge of Mississippi River at Anoka increased, contrary to the normal seasonal pattern, but remained in the below-normal range and was only 56 percent of median. In

(Continued on page 9.)

Provisional data: subject to revision

SELECTED DATA FOR THE GREAT LAKES, GREAT SALT LAKE, AND OTHER HYDROLOGIC SITES

GREAT LAKES LEVELS

Water levels are expressed as elevations in feet above International Great Lakes Datum 1955

(Data furnished by National Ocean Survey, NOAA, via U.S. Army Corps of Engineers office in Detroit. To convert data to elevations above mean sea level datum of 1929, add the following values: Superior, 0.96; Michigan-Huron, 1.20; St. Clair, 1.24; Erie 1.57; Ontario, 1.22.)

Lake	June 30, 1980	Monthly mean, June		June		
		1980	1979	Average 1900–75	Maximum (year)	Minimum (year)
Superior (Marquette, Mich.)	600.68	600.55	601.40	600.67	601.64 (1951)	598.63 (1926)
Michigan and Huron (Harbor Beach, Mich.)	579.87	579.67	579.79	578.54	580.89 (1973)	575.90 (1964)
St. Clair (St. Clair Shores, Mich.)	575.17	575.26	575.10	573.77	576.23 (1973)	571.74 (1934)
Erie (Cleveland, Ohio)	572.53	572.56	572.20	570.96	573.51 (1973)	568.46 (1934)
Ontario (Oswego, N.Y.)	246.01	245.94	245.94	245.55	248.06 (1952)	242.92 (1935)

GREAT SALT LAKE

Alltime high: 4,211.6 (1873). Alltime low: 4,191.35 (October 1963).	June 30, 1980	June 30, 1979	Reference period 1904–79		
			June average, 1904–79	June maximum (year)	June minimum (year)
Elevation in feet above mean sea level:	4,200.35	4,199.25	4,198.90	4,204.80 (1923)	4,192.75 (1963)

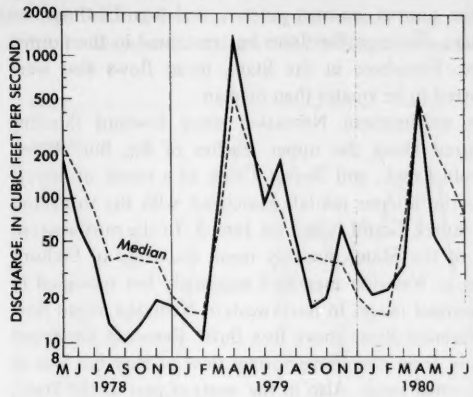
LAKE CHAMPLAIN, AT ROUSES POINT, N.Y.

Alltime high (1827–1979): 102.1 (1869). Alltime low (1939–1979): 92.17 (1941).	June 30, 1980	June 30, 1979	Reference period 1939–78		
			June average, 1939–78	June max. daily (year)	June min. daily (year)
Elevation in feet above mean sea level:	95.13	96.23	96.91	101.02 (1947)	94.35 (1965)

FLORIDA

Site	June 1980		May 1980	June 1979
	Discharge in cfs	Percent of normal	Discharge in cfs	Discharge in cfs
Silver Springs near Ocala (northern Florida)	770	101	750	780
Miami Canal at Miami (southeastern Florida)	0	0	35	320
Tamiami Canal outlets, 40-mile bend to Monroe	126	130	136	48

(Continued from page 7.)



Monthly mean discharge at Buffalo River near Dilworth, Minn. (Drainage area, 1,040 sq mi; 2,690 sq km)

northwestern Minnesota, the monthly mean discharge of 25 cfs in Clearwater River at Red Lake Falls (drainage area, 1,370 square miles) was the lowest for June in 52 years of record. Also in the northwestern part of the State, the monthly mean discharge of 10 cfs in Roseau River below State Ditch 51, near Caribou (drainage area, 1,570 square miles), was lowest for June since 1929. Similarly, in the extreme northeastern part of the State, the monthly mean flow of 231 cfs in Pigeon River at Middle Falls, near Grand Portage (drainage area, 600 square miles) was 4th lowest for the month since 1924. Also in the northern part of the State, the monthly mean discharge of 3,710 cfs in Rainy River at Manitou Rapids (drainage area, 19,400 square miles) was lowest for June in 52 years of record. In the southern part of the State, mean flows generally increased into the above-normal range. For example, monthly mean discharge of Minnesota River near Jordan increased sharply, from the below-normal range and 54 percent of median in May, to the above-normal range and 163 percent of median in June. Also, the monthly mean flow of 1,200 cfs in Des Moines River at Jackson (drainage area, 1,220 square miles) in southwestern Minnesota, was the 3d highest for June since records began in 1930, and the monthly mean discharge of 260 cfs in Pomme de Terre River at Appleton (drainage area, 905 square miles), tributary to Minnesota River, was in the above-normal range. In the extreme southeastern part of the State, rapid runoff from intense rains resulted in a peak stage of 10.07 feet in Root River tributary near Whalan (drainage area, 0.08 square mile), the highest stage recorded in 21 years of record.

GROUND-WATER CONDITIONS

Ground-water levels in shallow water-table wells in Minnesota declined a foot or less; they continued below average in the northern part of the State but continued slightly above average in the south. In the Minneapolis-St. Paul area, artesian levels declined in wells tapping the Prairie du Chien-Jordan and the deeper Mt. Simon-Hinckley aquifers in response to increased pumping for air conditioning; levels in both aquifers continued above average.

In Michigan, levels held steady in the southern part of the Lower Peninsula but declined elsewhere. Levels were below normal in most areas.

In Illinois, the level in the shallow well in glacial drift at Princeton, Bureau County, declined more than 4 feet and was slightly below average.

Levels in Indiana held steady because of continuing light showers during the month; levels were average, but were above average in a few wells in the central part of the State.

In Ohio, levels showed mixed trends but continued about normal except in the key well in the northeastern part of the State, where the level rose to a record June high in 20 years of record.

MIDCONTINENT

[Manitoba and Saskatchewan; Arkansas, Iowa, Kansas, Louisiana, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas]

Streamflow increased in Iowa, Oklahoma, and South Dakota, decreased in Arkansas, Louisiana, Texas, and Saskatchewan, and was variable elsewhere in the region. Monthly mean flows remained in the above-normal range in parts of Louisiana, and increased into that range in parts of Iowa. Mean flows persisted in the below-normal range in parts of Saskatchewan, Missouri, North Dakota, and South Dakota, and decreased into that range in parts of Kansas and Texas. Flooding occurred in Iowa, Missouri, Nebraska, and Oklahoma.

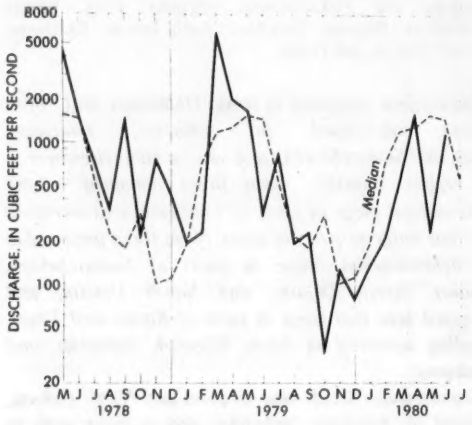
Ground-water levels rose in Iowa and North Dakota, declined in Arkansas, Nebraska, and in most wells in Louisiana and Texas; trends were mixed in Kansas. Levels were below average in Arkansas, Louisiana, Nebraska, and North Dakota, and mostly below average in Kansas and Texas; they were above average in Iowa. New low levels were recorded for June in Kansas, Arkansas, and Louisiana. New alltime lows were noted in Louisiana and Texas.

STREAMFLOW CONDITIONS

In south-central Iowa, moderate to severe flooding occurred in parts of the Chariton River and Elk Creek basins early in the month as a result of rapid runoff from high intensity rainfall. Selected data on stages,

discharges, gaging station locations, and recurrence intervals are given in the table and map on pages 6,7. In the eastern part of the State, monthly mean discharge of Cedar River at Cedar Rapids increased sharply, as a result of rains during the first few days of the month, was in the above-normal range, and was 200 percent of median. In north-central Iowa, where mean flow of Des Moines River at Fort Dodge was below the normal range in May, flow increased seasonally into the normal range and was 199 percent of median. Similarly, in the southwestern part of the State, monthly mean discharge of Nishnabotna River above Hamburg also increased into the normal range (from the below-normal range in May) and was 171 percent of median.

In northeastern Missouri, flooding occurred in the Fabius, Fox, Salt, and Wyaconda River basins during the first week in June. Selected data on stages, discharges, gaging station locations, and recurrence intervals are given in the table and map on pages 6,7. In the northwestern part of the State, where mean discharge of Grand River near Gallatin was below the normal range and only 15 percent of median in May, mean flow increased sharply into the normal range but was less than median. (See graph.) In the south-central part of the



Monthly mean discharge of Grand River near Gallatin, Mo. (Drainage area, 2,250 sq mi; 5,830 sq km)

State, monthly mean discharge of Gasconade River at Jerome continued to decrease seasonally, remained in the below-normal range, and was only 33 percent of the median flow for June.

In northeastern Oklahoma, rapid runoff from intense rains June 16–20 resulted in flash flooding on small streams in a narrow area extending from Alva through Tulsa to approximately 40 miles southeast of Muskogee. In the southwestern part of the State, monthly mean flow of Washita River near Durwood increased, contrary to the normal seasonal pattern, and was 2¼ times the median discharge for June but remained in the normal range. Elsewhere in the State, mean flows also were reported to be greater than median.

In southeastern Nebraska, some lowland flooding occurred along the upper reaches of Big Blue River, Lincoln Creek, and Beaver Creek as a result of runoff from the intense rainfall associated with the tornadoes that struck Grand Island on June 3. In the northeastern part of the State, monthly mean discharge of Elkhorn River at Waterloo increased seasonally but remained in the normal range. In northwestern Nebraska, mean flow of Niobrara River above Box Butte Reservoir decreased sharply from the above-normal flow of May but was in the normal range. Also in the western part of the State, mean flow of North Platte River at Lisco was 180 percent of the median discharge for June as a result of continued releases from the reservoirs on that stream in Wyoming. In the Republican River basin in southwestern Nebraska, mean flows of unregulated streams were about 40 percent of normal.

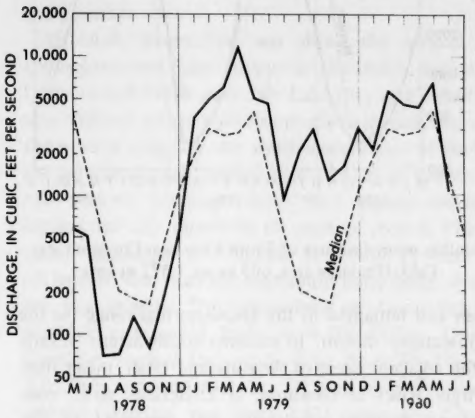
In western and southwestern parts of Kansas, monthly mean flows of Saline River near Russell and Arkansas River at Arkansas City decreased, contrary to the normal seasonal pattern, were in the below-normal range, and were 24 percent and 42 percent of the respective June median flows for those stations. In northeastern Kansas, mean discharge of Little Blue River near Barnes increased seasonally but was only 56 percent of median and remained in the normal range.

In Arkansas, monthly mean discharges of Buffalo River near St. Joe, in the northern part of the State, and Saline River near Rye, in the southern part, decreased seasonally but were greater than median and remained within the normal range.

In southeastern Louisiana, monthly mean flow of Amite River near Denham Springs continued to decrease seasonally but remained in the above-normal range for the 4th consecutive month as a result of high carryover flow from May augmented by increased runoff from rains during the last half of June. In the western part of the State, mean discharge in Calcasieu River near Oberlin decreased sharply and was in the normal range, following 3 consecutive months of flow in the above-normal range. In northwestern Louisiana, monthly mean discharge of Saline Bayou near Lucky also decreased sharply, was less than median, but remained in the normal range. Mean discharges of Red River at Alexandria and Mississippi River at Baton Rouge were 83 percent and 93 percent of their respective median flows for June.

In extreme eastern Texas, monthly mean flow of Neches River near Rockland decreased sharply from the

above-normal flow of May and was less than the median discharge for June but was within the normal range. (See graph.) In the east-central part of the State, mean flow



Monthly mean discharge of Neches River near Rockland, Tex. (Drainage area, 3,636 sq mi; 9,417 sq km)

of North Bosque River near Clifton also decreased sharply, was below the normal range, and was only 22 percent of median. In the upper reaches of the Brazos and Colorado River basins, and in the Gulf Coastal basins, monthly mean flows were in the normal range. Elsewhere in the State, mean discharges for the month were below the normal range.

In central South Dakota, monthly mean flow of Bad River near Fort Pierre increased seasonally but remained in the below-normal range and was only 5 percent of the June median flow. In the eastern part of the State, mean discharge of Big Sioux River, as measured at Akron, Iowa, increased seasonally and was 1½ times median, but remained in the normal range.

Similarly, in southwestern North Dakota, mean discharge of Cannonball River at Breien increased seasonally, was about 1½ times median, and was in the normal range. In the eastern part of the State, monthly mean flow of Red River of the North at Grand Forks decreased seasonally but was only 31 percent of median, and remained in the below-normal range as a result of low carryover flow from May.

In southeastern Saskatchewan, monthly mean discharge of Qu'Appelle River near Lumsden continued to decrease seasonally, was only 45 percent of median, and remained in the below-normal range as a result of low carryover flow from May. Mean flow has been less than median in each of the past 8 months at this station.

In southwestern Manitoba, the level of Lake Winnipeg at Gimli averaged 714.02 feet above mean sea level for the month, 0.01 foot lower than last month, 1.54 feet lower than the level of last June, and 0.05 foot higher than the long-term mean level for June. Records of Lake Winnipeg levels were started in May 1913 at Winnipeg Beach.

GROUND-WATER CONDITIONS

In North Dakota, ground-water levels rose slightly but continued below normal statewide.

In Nebraska, levels declined in most irrigated areas of the State, and at monthend were near or slightly lower than long-term averages.

In Iowa, levels in shallow water-table wells rose statewide and were above average or near average.

Trends were mixed in Kansas, and levels were average in the shallow well at Halstead and below average in the three other key wells. The level in the key well at Colby, at the Kansas Agricultural Experiment Station, declined 1/3 foot, reaching a new low for June in 33 years of record.

In Arkansas, in the rice-growing area in the east-central part of the State, the level in the key well in the shallow Quaternary aquifer declined 1½ feet and continued more than 5½ feet below average. The level in the well in the deep Sparta Sand aquifer declined 56 feet in response to resumption of seasonal pumping for irrigation; the level was 33½ feet below average. In that part of the Sparta Sand aquifer that lies in central and southern Arkansas, the level in the key well at Pine Bluff declined slightly, continued 33 feet below average, and was at a new low for June in 22 years of record. In the industrial aquifer of southern Arkansas—also the Sparta Sand—the level in the key well at El Dorado declined 1½ feet and was nearly 4½ feet below average.

In Louisiana, 15 of 16 observation wells declined in the southwestern area. The level in well JD-485, in the Chicot Sand, declined 27 feet, reaching an alltime low in nearly 40 years of record. In the Lake Charles industrial area, levels in wells in the 200-foot and 500-foot sands declined. Two wells monitoring the Evangeline aquifer reached record lows for June. In north-central Louisiana, levels in wells in the Sparta Sand and in the Miocene aquifers declined. Levels in the terrace alluvial aquifers were at normal seasonal levels. In southeastern Louisiana, levels in wells in the 1200-foot and 2000-foot sands of Baton Rouge rose several feet, but declined in the 600-foot, 1500-foot, and 2400-foot sands. In the New Orleans area and in the shallow aquifers of the Florida Parishes, levels declined seasonally.

In Texas, in the artesian Edwards Limestone aquifer, the level in the key well at Austin rose and was above average, whereas the level in the well at San Antonio declined and was below average. The artesian level in the

key well in the Evangeline aquifer at Houston declined and was below average. A new alltime low level was reached in the artesian Ogallala aquifer at Plainview in the Texas Panhandle.

WEST

[Alberta and British Columbia; Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming]

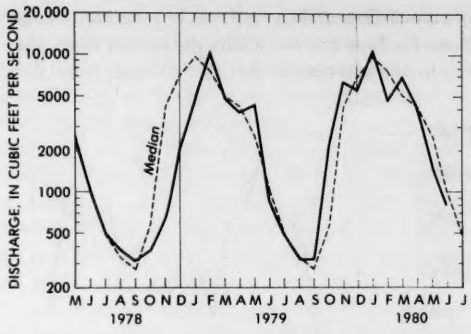
Streamflow generally increased seasonally in Alberta, Colorado, Nevada, and Utah, decreased seasonally in Arizona and Washington, and was variable elsewhere in the region. Monthly mean flows remained in the above-normal range in parts of Arizona, California, Colorado, Nevada, New Mexico, and Utah, and increased into that range in parts of Idaho and Oregon. Flows decreased into the below-normal range in parts of British Columbia, Montana, Oregon, Washington, and Wyoming. Monthly mean flow was highest of record in parts of Utah.

Ground-water levels rose in Idaho and Montana; and generally declined in Arizona, New Mexico, Nevada, Utah, and southern California. Trends were mixed in Washington. Levels were below average in Montana, Arizona, and New Mexico, and were mostly above average in southern California. A new high level for June occurred in Nevada, and a new alltime high was reached in the key well in the Blanding area of Utah. New lows for June were reached in Idaho, Utah (Holladay area), and New Mexico; two new alltime lows occurred in Arizona.

STREAMFLOW CONDITIONS

In southern California, monthly mean discharge of Arroyo Seco near Pasadena decreased seasonally, was 311 percent of median, and remained in the above-normal range for the 6th consecutive month. In the southern part of the Sierra Nevada west slope, monthly mean discharge of Kings River above North Fork, near Trimmer, was nearly twice the median flow for June. In north-coastal California, where mean flow of Smith River near Crescent City was below the normal range and only 61 percent of median in May, flow decreased seasonally and remained below median but was within the normal range. (See graph.) Elsewhere in northern California, mean flows were generally above median and within the normal range. Combined contents of 10 reservoirs in northern California were 113 percent of average and 110 percent of the contents one year ago.

In north-central Nevada, monthly mean flow of Humboldt River at Palisade was more than twice the median and remained in the above-normal range for the 2d consecutive month. In extreme southeastern Nevada and the adjacent areas of Arizona and Utah, mean flow of Virgin River as measured at Littlefield, Ariz., continued to decrease seasonally but remained in the above-normal range for the 6th consecutive month as a result of snowmelt runoff.



Monthly mean discharge of Smith River near Crescent City, Calif. (Drainage area, 609 sq mi; 1,577 sq km)

Similarly, in central Arizona, monthly mean discharge of Verde River below Tangle Creek, above Horseshoe Dam, continued to decrease seasonally, was 161 percent of median, and remained in the above-normal range for the 6th consecutive month. In the east-central part of the State, monthly mean flow of Salt River near Roosevelt remained in the above-normal range for the 5th consecutive month and was more than 4 times median. In southeastern Arizona, flow of Gila River at head of Safford Valley, near Solomon, decreased seasonally, remained in the above-normal range, and was 269 percent of median. Elsewhere in the State, monthly mean flows at index stations were near or above median but within the normal range.

In southwestern New Mexico, where monthly mean flows of Gila River near Gila during March, April, and May were within the normal range, flow decreased seasonally but was above the normal range in June as a result of high carryover flow. In the northern part of the State, mean flow of Rio Grande below Taos Junction Bridge near Taos, decreased seasonally, remained in the above-normal range for the 3d consecutive month, and was nearly 4 times median. In the north-central part of the State, mean flow of Pecos River near Pecos increased, contrary to the normal seasonal pattern of decreasing flow, and was in the above-normal range for the first time since February.

In Colorado, streamflow generally increased seasonally and monthly mean discharges at all index stations were in the above-normal range. Mean flows

ranged from 124 percent of median on Yampa River at Steamboat Springs to 235 percent of median on Bear Creek at Morrison. June marked the 6th consecutive month of above-normal streamflow at the index station at Morrison.

In Utah, streamflow was above the normal range throughout the State except at the index stations, Big Cottonwood Creek near Salt Lake City and Weber River near Oakley, where flows were above median but within the normal range. In the southwestern part of the State, the monthly mean discharge of 415 cfs at Beaver River near Beaver (drainage area, 90.7 square miles) was highest for any month in 68 years of record. The daily mean discharge of 580 cfs on June 11 was only 19 percent less than the maximum daily mean of record for any month. The water level of Great Salt Lake reached a seasonal high of 4,200.55 feet (National Geodetic Vertical Datum) on June 20, 1980. The rise of 3.05 feet between October 15 and June 20, was the greatest seasonal rise since 1971 when the lake rose 3.20 feet between October 15, 1970 and July 1, 1971.

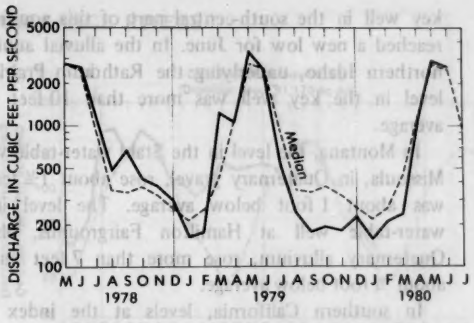
Contents of the Colorado River Storage Project increased 2,315,200 acre-feet during the month. Lake Powell was full for the first time on June 22, 1980 (usable storage 25,100,000 acre-feet), since storage began in March 1963.

In Wyoming, streamflow decreased, contrary to the normal seasonal pattern, with monthly mean discharges below the normal range in the Tongue River basin and above median but within the normal range in the North Platte River basin.

In southern Idaho, monthly mean flow in Snake River at Weiser increased sharply to 135 percent of median and was above the normal range for the first time since September 1978. In the northern part of the State, streamflow in the Kootenai River (adjusted for storage) decreased into the below-normal range. Elsewhere in the State, monthly mean flows at index stations were generally less than median but within the normal range. Reservoir storage was generally near average.

In Montana, streamflow was within the normal range at all index stations except Yellowstone River at Corwin Springs and Middle Fork Flathead River near West Glacier, where flows were 73 percent of median and below the normal range. In the northwestern part of the State, monthly mean discharge of Marias River near Shelby decreased seasonally but remained in the normal range and slightly above the median flow for June. (See graph.) Drought conditions were reported in the eastern half of the State.

In southwestern Alberta, where monthly mean discharge was above the normal range in April and May,



Monthly mean discharge of Marias River near Shelby, Mont. (Drainage area, 3,242 sq mi; 8,397 sq km)

flow increased seasonally but was less than median and within the normal range in June.

In British Columbia, monthly mean flows at both index stations decreased into the below-normal range and averaged 72 percent of median.

In northeastern Washington, monthly mean discharge of Skykomish River near Gold Bar decreased seasonally to 69 percent of median and was below the normal range for the first time since January 1980. Elsewhere in the State, mean flows at Spokane River at Spokane and Chehalis River near Grand Mound decreased seasonally but were above median and within the normal range.

In north-central Oregon, monthly mean discharge of John Day River at Service Creek increased, contrary to the normal seasonal pattern of decreasing flows, was 183 percent of median, and was above the normal range for the first month since September 1979. In north-coastal Oregon, monthly mean flow in Wilson River near Tillamook decreased seasonally, was 73 percent of median, and remained below the normal range for the 2d consecutive month. Elsewhere in the State, mean flows at index stations were less than median but within the normal range.

GROUND-WATER CONDITIONS

In Washington, the artesian ground-water level in the key well in Tacoma, in the western part of the State, declined ¾ foot and continued above average by nearly 4 feet. The level in the water-table well in Spokane Valley, in eastern Washington, rose slightly, but was more than 5½ feet below average.

In Idaho, the level in the key well in the sand and gravel aquifer in the Boise Valley rose nearly 2 feet and was 2½ feet above average. The level in the key well near Atomic City, in the eastern Snake River Plain aquifer, rose slightly, was 2½ feet below average, but was at a new low for June in 31 years of record. The level in the

key well in the south-central part of this aquifer also reached a new low for June. In the alluvial aquifer in northern Idaho, underlying the Rathdrum Prairie, the level in the key well was more than 10 feet below average.

In Montana, the level in the Stahl water-table well at Missoula, in Quaternary gravel, rose about 1¾ feet but was about 1 foot below average. The level in the water-table well at Hamilton Fairgrounds, also in Quaternary alluvium, rose more than 7 feet but was about ¾ foot below average.

In southern California, levels at the index wells declined except in the well near Baldwin Park in Los Angeles County, whose level rose 4½ feet. Levels were above average in the index wells except in the well at Los Alamitos in Orange County, where the level was 0.8 foot below average.

In Nevada, the level in the key well in Las Vegas declined, and continued below average. The artesian level in the well in Steptoe Valley declined, but was at a new high for June in 30 years of record. At Truckee Meadows, the level in the key well rose but continued below average.

In Utah, the level in the key well in the Blanding area rose, reaching a new alltime high in 20 years of record. Levels declined and were below average elsewhere in the State. The level in the key well in the Holladay area declined more than 6½ feet, reaching a new low for June in 32 years of record.

In Arizona, levels declined in four index wells and rose in one during June. A new alltime low level was reached in the well in valley fill in the Elfrida area in 29 years of record. A new alltime low was recorded also at another index well.

In New Mexico, levels in the key wells declined seasonally; all were below average.

ALASKA

Streamflow increased seasonally at index stations in southern Alaska but was variable at other stations in the State. For example, in east-central Alaska, where monthly mean flow of Chena River at Fairbanks was lowest of record for the month of May, flow continued to decrease seasonally, remained below the normal range, and was only 44 percent of median. Also in eastern Alaska, mean flow of Tanana River at Nenana, draining higher elevations than Chena River, continued to increase seasonally but remained in the below-normal range. In the south-central part of the State, mean flow of Little Susitna River near Palmer continued to increase seasonally and was within the normal range. In south-coastal Alaska, monthly mean discharge of Kenai River at Cooper Landing remained in the above-normal range for the 9th consecutive month. Cumulative runoff for the first 9 months of the 1980 water year at this station was twice the median cumulative runoff for that period. In southeastern Alaska, mean flow of Gold Creek at Juneau continued to increase seasonally and remained in the normal range.

Ground-water levels in confined aquifers in the Anchorage area rose near the Chugach Mountains and fell near Cook Inlet. Water-level changes were two feet or less except for greater changes near the centers of pumping.

HAWAII

On the island of Oahu, monthly mean flow of Kalihi Stream near Honolulu increased, contrary to the normal seasonal pattern of decreasing flow in June, was 380 percent of median, and remained in the above-normal range for the 4th consecutive month. On the island of Maui, mean discharge of Honopou Stream near Huelo decreased seasonally, was 260 percent of the June median flow, and remained above the normal range for the 4th consecutive month. Mean flow of Waiakea Stream near Mountain View, island of Hawaii, increased, contrary to the normal seasonal pattern, and was above the normal range.

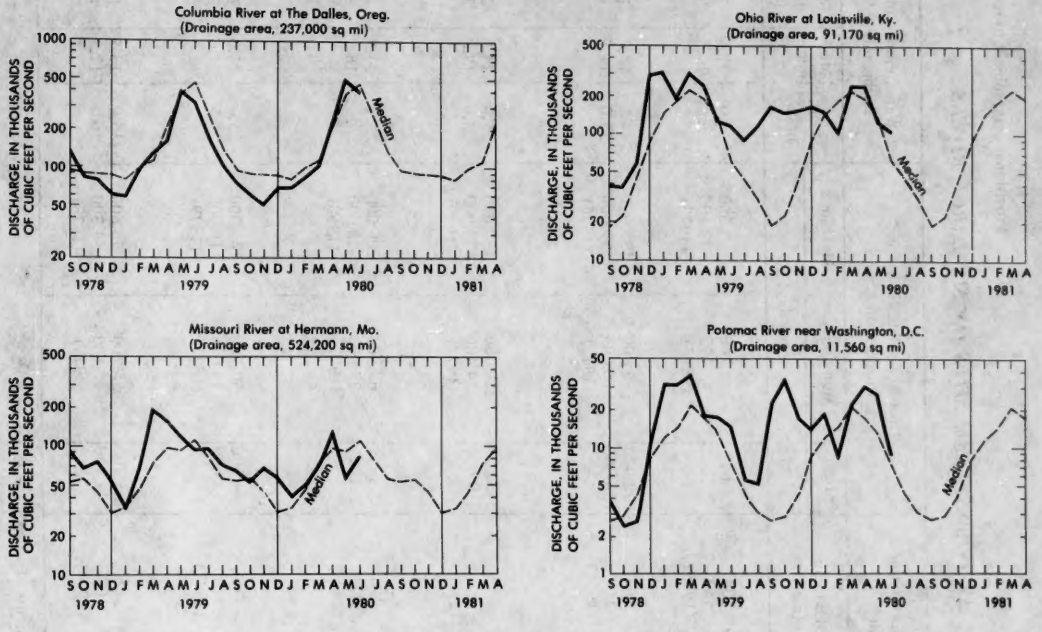
On Guam, Mariana Islands, monthly mean flow of Ylig River near Yona was 485 percent of the median discharge for June, and remained in the above-normal range for the 2d consecutive month.

METRIC EQUIVALENTS OF UNITS USED IN THE WATER RESOURCES REVIEW

(Round-number conversions, to nearest four significant figures)

1 foot = 0.3048 meter 1 mile = 1.609 kilometers
1 acre = 0.4047 hectare = 4,047 square meters
1 square mile (sq mi) = 259 hectares = 2.59 square kilometers (sq km)
1 acre-foot (ac-ft) = 1,233 cubic meters
1 million cubic feet (mcf) = 28,320 cubic meters
1 cubic foot per second (cfs) = 0.02832 cubic meters per second = 1.699 cubic meters per minute
1 second-foot-day (cfsd) = 2,447 cubic meters
1 million gallons (mg) = 3,785 cubic meters = 3.785 million liters
1 million gallons per day (mgd) = 694.4 gallons per minute (gpm) = 2.629 cubic meters per minute = 3,785 cubic meters per day

HYDROGRAPHS OF FOUR LARGE RIVERS



DISSOLVED SOLIDS AND WATER TEMPERATURES FOR JUNE ON SIX LARGE RIVERS

The table on page 16 shows dissolved-solids and temperature data for June at six stream-sampling sites that are part of the National Stream Quality Accounting Network (NASQAN). NASQAN, as established by the U.S. Department of the Interior, Geological Survey, is designed to describe the water quality of the Nation's streams and rivers on a systematic and continuing basis, so as to meet many of the information needs of those involved in national or regional water-quality planning and management.

"Dissolved solids," as described in several columns of the table, are minerals dissolved in water and usually consist predominantly of silica and ions of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, and nitrate. These same minerals are among the most common components of the Earth's solid rocks and minerals, but gradually erode and at least partly dissolve as a part of natural weathering processes. Collectively these and other dissolved minerals constitute the dissolved-solids concentration expressed in milligrams per liter (mg/L) or the generally equivalent expression, parts per million (parts of dissolved matter in one million parts of water, by weight). Values of dissolved solids are convenient for comparing the quality of water from one time to another and from one place to another. Most drinking water contains between 50 and 500 mg/L of dissolved solids.

"Dissolved-solids discharge," expressed in tons per day, represents the total daily amount of dissolved minerals carried by the stream and is calculated by multiplying the dissolved-solids concentration (in mg/L) by the stream discharge (in cfs; times a unit conversion factor of .0027). Even though dissolved-solids *concentrations* are generally higher during periods of low streamflow than of high streamflow, the highest dissolved-solids *discharges* occur during periods of high streamflow because the total quantities of water, and therefore total load of dissolved minerals, are so much greater than at times of low flow.

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR JUNE AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	June data of following calendar years	Stream discharge during month	Dissolved-solids concentration during month[a]		Dissolved-solids discharge during month[a]			Water temperature during month[b]		
			Mean (cfs)	Minimum (mg/L)	Maximum (mg/L)	Mean	Minimum	Maximum	Mean, in °C	Minimum, in °C	Maximum, in °C
						(tons per day)					
	NORTHEAST										
01463500	Delaware River at Trenton, N.J. (Morrisville, Pa.)	*1980	4,870	112	134	1,610	1,240	2,360	24.0	21.5	27.0
		1945–79 (Extreme yr)	952,600	60 (1945)	143 (1965)	.....	495 (1965)	22,100 (1973)	.....	13.5	34.0
			[c]6,992								
04264331	St. Lawrence River at Cornwall, Ontario, near Massena, N.Y. median streamflow at Ogdensburg, N.Y.	1980	291,000	167	168	132,000	130,000	133,000	14.5	13.0	16.5
		1976–79 (Extreme yr)	303,800	166 (1976–78)	169 (1976)	136,000	110,000 (1977)	159,000 (1976)	15.0	11.5	17.5
			[c]261,500								
	SOUTHEAST										
07289000	Mississippi River at Vicksburg, Miss.	1980	586,900	211	258	243,000	220,000	430,000	25.0	24.5	26.0
		1976–79 (Extreme yr)	531,400	209 (1979)	316 (1976)	259,000	34,400 (1978)	579,000 (1979)	25.0	17.0	31.0
			[c]591,400								
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam 53, near Grand Chain, Ill. (25 miles west of Paducah, Ky.; streamflow station at Metropolis, Ill.)	**1980	224,000	197	270	.....	63,900	206,000	.....	23.5	25.5
		1955–79 (Extreme yr)	203,100	111 (1974)	300 (1970)	.....	27,000 (1977)	328,000 (1968)	.....	16.5	30.5
			[c]174,600								
	MIDCONTINENT										
06934500	Missouri River at Hermann, Mo. (60 miles west of St. Louis, Mo.)	1980	81,600	310	448	84,300	57,700	143,000	25.0	24.0	26.0
		1976–79 (Extreme yr)	83,300	207 (1977)	418 (1977)	72,600	44,000 (1977)	119,000 (1979)	24.5	21.0	28.0
			[c]109,600								
	WEST										
14128910	Columbia River at Warrendale, Oreg. (streamflow station at The Dalles, Oreg.)	1980	287,700	79	88	65,100	56,700	76,800	15.0	13.5	17.0
		1976–79 (Extreme yr)	205,800	61 (1976)	107 (1977)	41,900	19,100 (1977)	64,300 (1978)	16.0	12.5	19.5
			[c]454,200								

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]To convert °C to °F: [(1.8 X °C) + 32] = °F.
[c]Median of monthly values for 30-year reference period, water years 1941–70, for comparison with data for current month.
*Dissolved solids and water temperatures are for 16 days only.
**Water temperatures are for 10 days only.

Provisional data; subject to revision

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF JUNE 1980

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of May 1980	End of June 1980	End of June 1979	Average for end of June	Normal maximum
	Percent of normal maximum				
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	75	65	90	71	226,300 (a)
QUEBEC					
Allard (P)	91	88	90	82	280,600 ac-ft
Gouin (P)	75	72	75	64	6,954,000 ac-ft
MAINE					
Seven reservoir systems (MP)	69	66	92	88	178,500 mcf
NEW HAMPSHIRE					
First Connecticut Lake (P)	86	92	92	90	3,330 mcf
Lake Francis (FPR)	83	97	86	87	4,326 mcf
Lake Winnipesaukee (PR)	100	94	94	96	7,220 mcf
VERMONT					
Harriman (P)	82	79	82	83	5,060 mcf
Somerset (P)	79	80	85	86	2,500 mcf
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	90	84	91	88	3,394 mcf
NEW YORK					
Great Sacandaga Lake (FPR)	99	93	90	92	34,270 mcf
Indian Lake (FMP)	91	97	103	101	4,500 mcf
New York City reservoir system (MW)	98	90	97	.....	547,500 mg
NEW JERSEY					
Wanaque (M)	99	88	95	89	27,730 mg
PENNSYLVANIA					
Allegheny (FPR)	48	49	48	49	51,400 mcf
Pymatuning (FMR)	102	101	95	97	8,191 mcf
Raystown Lake (FR)	68	68	67	59	33,190 mcf
Lake Wallenpaupack (PR)	85	81	71	86	6,875 mcf
MARYLAND					
Baltimore municipal system (M)	101	99	99	93	85,340 mg
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	96	99	94	91	12,580 mcf
Narrows (Badin Lake) (P)	98	95	95	98	5,616 mcf
High Rock Lake (P)	92	89	86	78	10,230 mcf
SOUTH CAROLINA					
Lake Murray (P)	97	96	94	79	70,300 mcf
Lakes Marion and Moultrie (P)	91	85	89	75	81,100 mcf
SOUTH CAROLINA--GEORGIA					
Clark Hill (FP)	89	80	79	73	75,360 mcf
GEORGIA					
Burton (PR)	98	98	98	91	104,000 mcf
Sinclair (MPR)	88	95	76	91	214,000 ac-ft
Lake Sidney Lanier (FMPR)	67	66	65	66	1,686,000 ac-ft
ALABAMA					
Lake Martin (P)	99	98	100	91	1,373,000 ac-ft
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	71	61	74	62	1,156,000 cfsd
Douglas Lake (FPR)	88	77	87	68	703,100 cfsd
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	94	91	91	81	510,300 cfsd
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	71	68	88	68	1,452,000 cfsd
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	94	89	94	83	745,200 cfsd
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	66	67	97	87	15,900 mcf
Wisconsin River (21 reservoirs) (PR)	62	72	92	82	17,400 mcf
MINNESOTA					
Mississippi River headwater system (FMR)	26	26	33	40	1,640,000 ac-ft
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	81	88	92	95	22,700,000 ac-ft
SOUTH DAKOTA					
Angostura (I)	95	95	96	91	127,600 ac-ft
Bell Fourche (I)	49	50	80	71	185,200 ac-ft
Lake Francis Case (FIP)	76	77	80	84	4,834,000 ac-ft
Lake Oahe (FIP)	83	82	98	.....	22,530,000 ac-ft

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of May 1980	End of June 1980	End of June 1979	Average for end of June	Normal maximum
	Percent of normal maximum				
MIDCONTINENT REGION–Continued					
SOUTH DAKOTA--Continued					
Lake Sharpe (FIP)	101	102	103	100	1,725,000 ac-ft
Lewis and Clarke Lake (FIP)	80	82	81	88	477,000 ac-ft
NEBRASKA					
Lake McConaughy (IP)	91	92	77	79	1,948,000 ac-ft
OKLAHOMA					
Eufaula (FPR)	101	103	110	94	2,378,000 ac-ft
Keystone (FPR)	106	132	106	103	661,000 ac-ft
Tenkiller Ferry (FPR)	106	103	106	101	628,200 ac-ft
Lake Altus (FIMR)	83	94	93	71	133,000 ac-ft
Lake O'The Cherokees (FPR)	96	96	101	96	1,492,000 ac-ft
OKLAHOMA--TEXAS					
Lake Texoma (FMPRW)	93	98	103	101	2,722,000 ac-ft
TEXAS					
Bridgeport (IMW)	30	26	52	52	386,400 ac-ft
Canyon (FMR)	95	92	100	77	385,600 ac-ft
International Amistad (FIMPW)	88	84	103	78	3,497,000 ac-ft
International Falcon (FIMPW)	66	63	100	66	2,668,000 ac-ft
Livingston (IMW)	104	96	100	85	1,788,000 ac-ft
Possum Kingdom (IMPRW)	92	96	95	99	570,200 ac-ft
Red Bluff (PI)	23	20	30	27	307,000 ac-ft
Toledo Bend (P)	103	97	98	90	4,472,000 ac-ft
Twin Buttes (FIM)	40	39	60	28	177,800 ac-ft
Lake Kemp (IMW)	62	62	63	94	268,000 ac-ft
Lake Meredith (FMW)	27	27	31	38	821,300 ac-ft
Lake Travis (FIMPRW)	92	88	98	80	1,144,000 ac-ft
THE WEST					
WASHINGTON					
Ross (PR)	71	98	94	89	1,052,000 ac-ft
Franklin D. Roosevelt Lake (IP)	100	103	91	102	5,022,000 ac-ft
Lake Chelan (PR)	85	95	93	96	676,100 ac-ft
Lake Cushman	101	103	103	98	359,500 ac-ft
Lake Merwin (P)	104	104	105	105	245,600 ac-ft
IDAHO					
Boise River (4 reservoirs) (FIP)	97	90	81	90	1,235,000 ac-ft
Coeur d'Alene Lake (P)	103	98	100	84	238,500 ac-ft
Pend Oreille Lake (FP)	96	98	100	98	1,561,000 ac-ft
IDAHO--WYOMING					
Upper Snake River (8 reservoirs) (MP)	94	93	80	84	4,401,000 ac-ft
WYOMING					
Boysen (FIP)	85	103	78	88	802,000 ac-ft
Buffalo Bill (IP)	75	105	84	102	421,300 ac-ft
Keyhole (F)	73	70	83	54	190,400 ac-ft
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	78	82	74	64	3,056,000 ac-ft
COLORADO					
John Martin (FIR)	44	49	2	18	364,400 ac-ft
Taylor Park (IR)	67	92	95	96	106,200 ac-ft
Colorado–Big Thompson project (I)	77	92	74	74	722,600 ac-ft
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR)	90	97	86	....	31,620,000 ac-ft
UTAH--IDAHO					
Bear Lake (IPR)	92	96	79	70	1,421,000 ac-ft
CALIFORNIA					
Folsom (FIP)	83	87	92	89	1,000,000 ac-ft
Hetch Hetchy (MP)	72	91	100	81	360,400 ac-ft
Isabella (FIR)	87	99	74	46	568,100 ac-ft
Pine Flat (FI)	74	92	91	70	1,001,000 ac-ft
Clair Engle Lake (Lewiston) (P)	96	96	86	89	2,438,000 ac-ft
Lake Almanor (P)	94	99	79	64	1,036,000 ac-ft
Lake Berryessa (FIMW)	94	92	74	83	1,600,000 ac-ft
Millerton Lake (FI)	69	96	93	82	503,200 ac-ft
Shasta Lake (FIPR)	96	91	92	87	4,377,000 ac-ft
CALIFORNIA--NEVADA					
Lake Tahoe (IPR)	71	66	35	73	744,600 ac-ft
NEVADA					
Rye Patch (I)	84	93	66	66	194,300 ac-ft
ARIZONA--NEVADA					
Lake Mead and Lake Mohave (FIMP)	88	88	85	73	27,970,000 ac-ft
ARIZONA					
San Carlos (IP)	89	84	95	16	1,073,000 ac-ft
Salt and Verde River system (IMPR)	98	92	95	45	2,073,000 ac-ft
NEW MEXICO					
Conchas (FIR)	54	54	49	83	330,100 ac-ft
Elephant Butte and Caballo (FIPR)	49	57	31	30	2,453,000 ac-ft

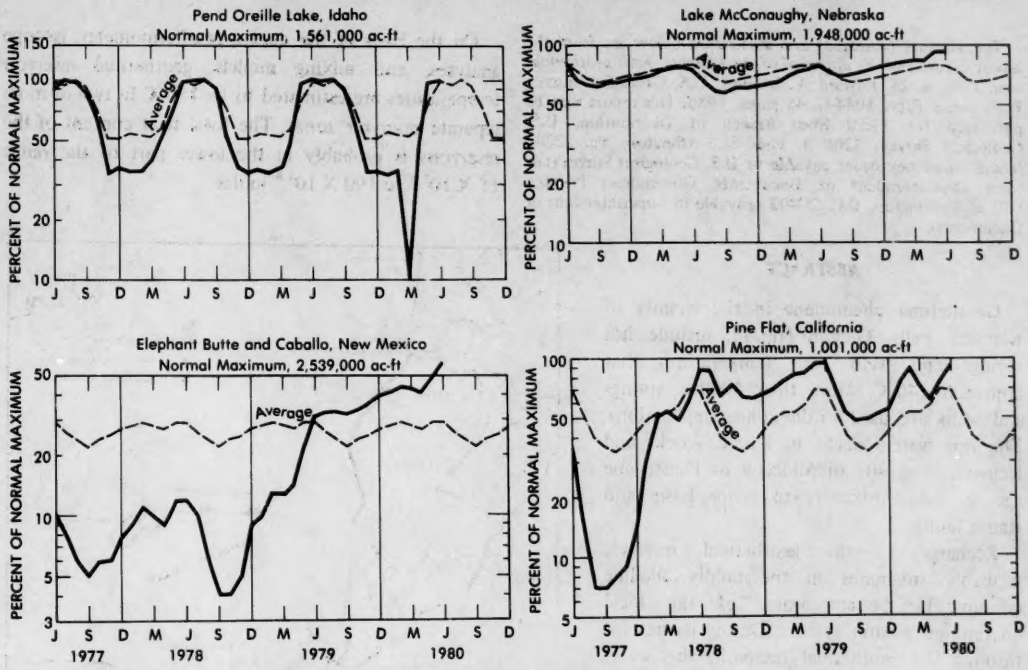
[a]Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

FLOW OF LARGE RIVERS DURING JUNE 1980

Station number*	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1975 (cfs)	June 1980					
				Monthly discharge (cfs)	Percent of median monthly discharge, 1941–70	Change in discharge from previous month (percent)	Discharge near end of month		
							(cfs)	(mgd)	Date
1–0140	St. John River below Fish River at Fort Kent, Maine	5,690	9,549	4,610	49	-68	3,400	2,200	30
1–3185	Hudson River at Hadley, N.Y	1,664	2,853	1,880	81	-39	1,000	650	30
1–3575	Mohawk River at Cohoes, N.Y	3,456	5,630	1,997	65	-41	1,100	710	30
1–4635	Delaware River at Trenton, N.J	6,780	11,630	4,903	70	-61	3,980	2,570	25
1–5705	Susquehanna River at Harrisburg, Pa	24,100	34,200	14,140	62	-65	10,200	6,590	25
1–6465	Potomac River near Washington, D.C	11,560	[1]11,190	8,470	114	-68	4,210	2,720	30
2–1055	Cape Fear River at William O. Huske Lock near Tarheel, N.C	4,810	5,007	3,200	165	-7	10,200	6,590	30
2–1310	Pee Dee River at Peedee, S.C	8,830	9,657	5,500	93	-49	3,490	2,260	26
2–2260	Altamaha River at Doctortown, Ga	13,600	13,780	12,240	143	+4	7,600	4,910	28
2–3205	Suwannee River at Branford, Fla	7,880	6,970	6,630	133	-47	5,600	3,620	30
2–3580	Apalachicola River at Chattahoochee, Fla	17,200	22,330	16,600	101	-52	21,400	13,800	30
2–4670	Tombigbee River at Demopolis lock and dam near Coatopa, Ala	15,400	22,570	10,020	156	-77	14,500	9,370	27
2–4895	Pearl River near Bogalusa, La	6,630	9,263	6,394	179	-79	7,170	4,630	30
3–0495	Allegheny River at Natrona, Pa	11,410	[1]19,210	17,360	152	-2	10,300	6,660	25
3–0850	Monongahela River at Braddock, Pa	7,337	[1]12,360	18,660	296	-4	4,550	2,940	25
3–1930	Kanawha River at Kanawha Falls, W.Va	8,367	12,530	6,710	100	-57	2,960	1,910	25
3–2345	Scioto River at Higby, Ohio	5,131	4,513	7,960	390	+68	3,310	2,140	25
3–2945	Ohio River at Louisville, Ky[2]	91,170	114,100	106,000	173	-17	49,200	31,800	24
3–3775	Wabash River at Mount Carmel, Ill	28,635	27,030	38,250	180	+57	25,400	16,400	30
3–4690	French Broad River below Douglas Dam, Tenn	4,543	[1]6,794	5,060	108	-38	.....	.....	....
4–0845	Fox River at Rapide Croche Dam, near Wrightstown, Wis[2]	6,150	4,185	5,980	158	+57	.....	.....	....
02MC002 (4–2643.31)	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y[3]	299,000	241,100	291,000	111	-2	289,000	187,000	30
050115	St. Maurice River at Grand Mere, Quebec	16,300	25,300	12,800	42	-59	17,100	11,100	27
5–0825	Red River of the North at Grand Forks, N. Dak	30,100	2,524	1,425	31	-29	1,000	650	30
5–1335	Rainy River at Manitou Rapids, Minn	19,400	12,950	3,710	18	-42	3,580	2,310	24
5–3300	Minnesota River near Jordan, Minn	16,200	3,412	8,960	163	+225	5,170	3,340	24
5–3310	Mississippi River at St. Paul, Minn	36,800	[1]10,580	21,000	118	+154	11,700	7,560	24
5–3655	Chippewa River at Chippewa Falls, Wis	5,600	5,110	4,600	82	+90	.....	.....	....
5–4070	Wisconsin River at Muscoda, Wis	10,300	8,613	13,200	135	+103	.....	.....	....
5–4465	Rock River near Joslin, Ill	9,551	5,852	7,030	128	+39	4,300	2,780	30
5–4745	Mississippi River at Keokuk, Iowa	119,000	62,570	96,900	111	+106	53,000	34,300	30
6–2145	Yellowstone River at Billings, Mont	11,796	6,986	21,380	81	+16	18,200	11,800	30
6–9345	Missouri River at Hermann, Mo	524,200	79,750	81,930	75	+46	60,000	38,800	25
7–2890	Mississippi River at Vicksburg, Miss[4]	1,140,500	573,600	586,900	99	-14	580,000	375,000	27
7–3310	Washita River near Durwood, Okla	7,202	1,414	3,775	223	+49	1,600	1,030	30
8–2765	Rio Grande below Taos Junction Bridge, near Taos, N. Mex	9,730	724	3,017	397	-2	1,960	1,270	30
9–3150	Green River at Green River, Utah	40,600	6,366	23,130	125	-9	14,000	9,050	26
11–4255	Sacramento River at Verona, Calif	21,257	19,150	15,000	141	+31	16,900	10,900	26
13–2690	Snake River at Weiser, Idaho	69,200	18,170	33,050	135	+20	25,800	16,700	23
13–3170	Salmon River at White Bird, Idaho	13,550	11,290	34,040	89	-13	37,700	24,400	23
13–3425	Clearwater River at Spalding, Idaho	9,570	15,570	34,470	94	+8	23,240	15,000	23
14–1057	Columbia River at The Dalles, Oreg[5]	237,000	194,600	412,400	87	-19	.....	.....	....
14–1910	Willamette River at Salem, Oreg	7,280	23,810	12,300	91	-3	8,730	5,640	26–30
15–5155	Tanana River at Nenana, Alaska	25,600	23,850	36,150	77	+78	34,000	22,000	30
8MF005	Fraser River at Hope, British Columbia	83,800	96,400	173,000	70	-4	189,000	122,000	30

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.
*The U.S. station numbers as listed in this table are in a shortened form previously in use, and used here for simplicity of tabular and map presentation. The full, correct number contains 8 digits and no punctuation marks. For example, the correct form for station number 1–3185 is 01318500.

USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS, JUNE 1977 TO JUNE 1980



Near- or above-average contents characterized many reservoirs in the United States during June. Monthend contents of several key reservoirs in the West, however, were much above average, including Elephant Butte and Caballo reservoirs in New Mexico. (See graph above.)

WATER RESOURCES REVIEW

June 1980

Based on reports from the Canadian and U.S. field offices; completed July 10, 1980

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EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for June based on 20 index stream-gaging stations in Canada and 130 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations which are located near the points shown by the arrows.

Streamflow for June 1980 is compared with flow for June in the 30-year reference period 1941–70. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow for June is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being *within the normal range.* In the Water Resources Review the median is obtained by ranking the 30 flows of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median.

The normal is an average (but not an arithmetic average) or middle value; half of the time you would expect the June flows to be below the median and half of the time to be above the median. Shorter reference periods are used for the Alaska index stations because of the limited records available.

Statements about *ground-water levels* refer to conditions near the end of June. Water level in each key observation well is compared with average level for the end of June determined from the entire past record for that well or from a 20-year reference period, 1951–70. *Changes in ground-water levels,* unless described otherwise, are from the end of May to the end of June.

The Water Resources Review is published monthly. Special-purpose and summary issues are also published. Issues of the Review are free on application to the Water Resources Review, U.S. Geological Survey, Reston, Virginia 22092.

HYDROGEOLOGIC APPRAISAL OF THE KLAMATH FALLS GEOTHERMAL AREA, OREGON

The abstract (abridged) and illustration below are from the report, *Hydrogeologic appraisal of the Klamath Falls geothermal area, Oregon*, by Edward A. Sammel: U.S. Geological Survey Professional Paper 1044-G, 45 pages, 1980. This report may be purchased for $3.50 from Branch of Distribution. U.S. Geological Survey, 1200 S. Eads St., Arlington, Va. 22202 (check or money order payable to U.S. Geological Survey); or from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 (payable to Superintendent of Documents).

ABSTRACT

Geothermal phenomena in the vicinity of Klamath Falls, Oregon (fig. 1), include hot springs and wells with temperatures that approach 140°C. More than 400 hot springs and wells are used for direct-heat applications. The hot waters occur in basaltic rocks and lacustrine deposits of Miocene to Pleistocene age in close proximity to major Basin and Range faults.

Recharge to the geothermal reservoir probably originates in the mildly alkaline calcium bicarbonate water of the local unconfined aquifer system. During its passage through the geothermal reservoir, this water gains dissolved solids up to concentrations of about 900 milligrams per liter; sodium and sulfate become the dominant ions.

Most geothermal gradients in the area are strongly influenced by the convective flow of hot water, making them unreliable indicators of depths to the geothermal reservoir. Heat flow in the Lower Klamath Lake basin is 1.4 microcalories per square centimeter per second (heat flow units), a value near the expected minimum for the Basin and Range province.

Net thermal flux from springs and wells is approximately 2×10^6 calories per second. Total convective discharge of heat above the regional datum of 12°C in ground water may be as much as 32×10^6 calories per second. Currently (1978), about 1.4×10^5 calories per second (6 megawatts) of geothermal heat is beneficially used in the area.

On the basis of the quartz geothermometer, isotope analyses, and mixing models, geothermal reservoir temperatures are estimated to be 150°C in two or more separate reservoir zones. The total heat content of the reservoirs is probably in the lower part of the range 15×10^{18} to 190×10^{18} joules.

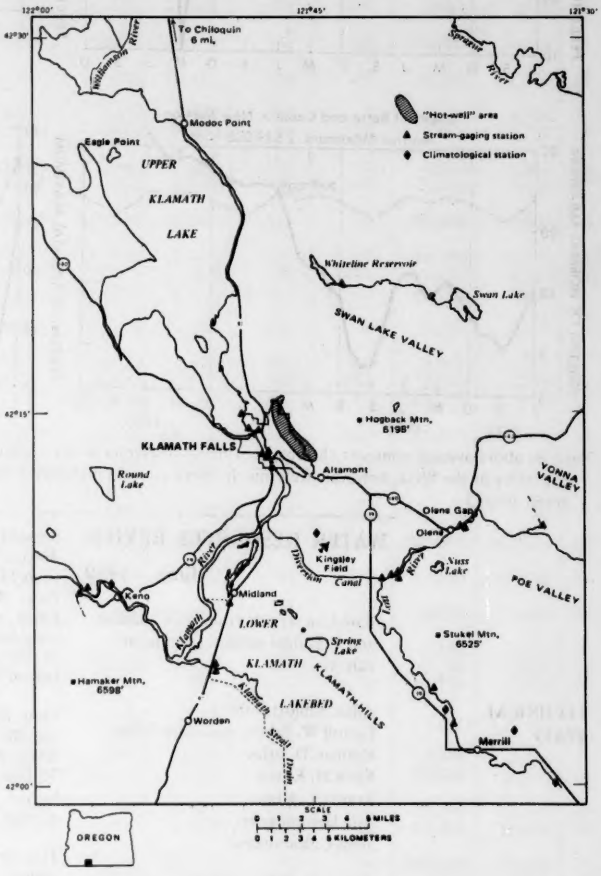

Figure 1.—The Klamath Falls area, location of "hot-well" area, National Weather Service stations, and stream-gaging stations.

* * *